CONVERTING OFFICE TRASH AND SENSITIVE UNCLASSIFIED WASTE INTO CLEAN ENERGY

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Abstract

In 1997, the Idaho National Engineering and Environmental Laboratory (INEEL) installed equipment that enabled Lockheed Martin Idaho Technologies Company to convert waste material that is combustible into process engineered fuel. This fuel is made from unclassified sensitive documents, routine office trash, and wood chips. The equipment has been utilized extensively in the agricultural industry to process hay into compact cubes to reduce storage volume and costs. The same equipment is now utilized at the INEEL to convert material previously buried at the INEEL landfill into cubes that displace a portion of the coal used to generate steam. The cubes and coal are mixed and fed into the Coal Fired Steam Generating Facility which burns the mixture to produce process and heating steam for the Idaho Chemical Processing Plant at the INEEL.

This paper describes (with the use of pictures) the processes that gets the waste from the point of generation, processes it, and converts the combustible portion into cubes for incineration in a waste to energy system.

Introduction

Disposal of industrial waste has always been accomplished by utilizing land disposal methods. New and innovative methods for recovering this resource have been identified in the past few years and the Idaho National Engineering and Environmental Laboratory (INEEL) has capitalized on one of these methods. Additionally, the destruction of sensitive unclassified information (SUI) has always been expensive due to the need for special controls to ensure its protection from disclosure to unauthorized personnel. The sensitive documents were shredded, buried at the landfill, or sent to a recycling company. The Departnent of Energy (DOE) Idaho National Engineering and Environmental Laboratory, operated by Lockheed Martin Idaho Technologies Company (LMITCO), has utilized an innovative method to dispose of its routine office waste and sensitive unclassified paper waste which has security, economic, and environmental benefits.

A new cubing facility at the INEEL converts office and industrial waste into compact cubes which are then combined with coal and burned as a source of heat to produce steam used for processing and heat at the Idaho Chemical Processing Plant (ICPP) facility. The waste material is sorted, then cubed, resulting in the production of process engineered fuel (PEF). The PEF is mixed with coal and utilized as feed in the Coal Fired Steam Generating Facility. This feed nominally consists of 25% cubes and 75% coal and burns cleaner than coal with lower emissions of sulfur oxides and nitrogen oxides. The alternative fuel also reduces fuel costs, eliminates paying a recycling

company, reduces the expense of landfill disposal, increases the life of the landfill, and provides energy to operate a large facility.

The Operations Security (OPSEC) team capitalized on this waste to energy technology by recommending that the large quantities of sensitive information (documents) generated at the INEEL be disposed of in this manner. In addition to the economic and environmental benefits, this disposal method minimizes the vulnerabilities of SUI from disclosure to unauthorized personnel. The INEEL has been designated as the DOE complex wide facility that is able to dispose of SUI material by utilizing this material as feed for the cubing system.

Waste-To-Cubes Process

In September 1996, the INEEL installed equipment which enabled LMITCO to convert material, which was previously sent to the landfill, into process engineered fuel. This fuel was made from paper and routine trash generated at the 890-squaremile site facility, offices, and research facilities as well as waste generated at intown office facilities. A grant from the DOE Pollution Program funded this effort which made procurement and setup of the equipment possible.

The equipment has been used extensively in the agricultural industry to process hay into compact cubes to reduce shipping and storage costs. This same equipment is now used to cube trash, which is ultimately used to displace a portion of the coal feed in the Coal Fired Steam Generating Facility (CFSGF). This facility generates process and heating steam for use at the ICPP.

Waste from offices and buildings at the INEEL and from in-town facilities is collected by dumpmaster trucks and taken to the Cold Waste Handling Facility at the ICPP for segregation and processing. The trucks are emptied at a staging/processing facility, where the hands-on portion of the work begins. The waste is moved onto moving conveyor belts and spread out for segregation. Many items can be cubed, including paper, wood, cardboard, food items, Styrofoam, plastics, paper towels, and just about any other item that is routinely placed in trash that can be burned. Any item that can be used as fuel remains on the conveyor belt for transfer into the shredder. Non-burnable items, such as cans, metals, metal ringed binders, and medical wastes, are placed on another conveyor belt for shredding and transfer to the INEEL landfill for burial. The INEEL landfill is considered an industrial landfill and the types of material that can be buried are very limited.

The waste that goes to the shredder for cubing is shredded and sent to one of two metering boxes (utilized for storage of shredded materials). When enough material is contained within the two metering boxes, the cubing system is started and the shredded waste is converted into cubes. The cubes are placed into a trailer for transfer to the CFSGF.

The CFA landfill also has a wood chipper which converts waste wood into wood chips. The wood chipper is fed old wood and bailed cardboard which results in a product that is ideally suited as a feedstock for the waste cubing system. The woodchips, cardboard and trash are mixed and then fed into the waste cubing system. The addition of wood and cardboard to the collected waste increases the BTU content of the final cubed product.

Process engineered fuel (cubes) can displace up to 30% of the coal fed into the CFSGF without any impact to the facility's operating permit.

Many commercial waste facility operators and waste generators have inquired about the INEEL cubing/incineration process. The INEEL has hosted demonstrations for interested visitors from several countries and from many facilities within the United States. Since the cuber can process over 140 tons of waste a day, it has many applications throughout the waste management industry.

Value of Material Replacing Coal

Incineration of one ton of coal generates about eleven pounds of sulfur and nitrous oxides. These gases are normally exhausted into the environment and combine with water droplets in the atmosphere to produce acid rain. Incineration of cubed waste generates minute amounts of these gases and helps reduce acid rain to the environment. Cubed waste currently displaces about 30 tons of coal per month. When the waste handling facility gets up to full capacity, that number should triple to about 100 tons of coal per month. Besides the savings of coal at about $ 50.00 per ton there are obvious positive environmental impacts. Although cardboard is currently recycled, plans are to add cardboard and wood chips to the waste stream to increase the BTU content of the cubes and the amount of cubes generated.

Another positive environmental impact is reducing the amount of waste material requiring burial at the INEEL landfill. Labor costs are reduced since daily cover is not required for cubed material and material diverted to the cubing system can not have environmental impacts resulting from burial.

Future Plans for the Cold Waste Handling System

Meetings have been held with surrounding communities to determine if they are interested in sending some of their waste material to the INEEL waste cubing system. They understand that some presorting of the waste would be required and currently feel the cost is not justified. They have also stated that the cost of running a municipal landfill is getting more and more expensive and this option may well be more and more attractive as time passes.

Evaluation is ongoing to add co-generation capabilities at the CFSGF. If funding can be identified and this capability can be added, permitting will be sought from the State to operate the CFSGF with a greater percentage of cubed waste.

A CRADA has been signed to study additives to the cubing process that will make the cubes burn even cleaner. If this material that will be added during the cubing process performs as expected, technology transfer to many areas of the world will follow.

Many organizations are very interested in the sorting and cubing technology. LMITCO has hosted many visitors from other DOE sites, municipalities, companies, and foreign countries. Currently, the facility is visited by outside organizations on a weekly basis. The possibilities and capabilities of this facility and equipment are endless.

Conclusion The waste-to-cubes system at the INEEL has shown that a material previously considered waste can be utilized as an important source of energy. Add to that a method of destroying sensitive information and you have an idea whose time has come. This system has not only solved the problem of disposing of sensitive paper trash, but also contributes to environmental awareness and cost reduction. The use of up to 30% of the paper cubes in the CFSGF results in a cleaner burn with less polluting emissions and reduces the amount of money spent for coal. The reduction in the amount of paper trash being sent to the landfill also reduces the costs of operating the landfill.

References (1) Department of Energy, Office of Safeguards and Security, *"Operations Security Procedural Guide" July 1996*